

TO WHOM IT MAY CONCERN

Page 1 of 2

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 369180/1
 DATE OF ISSUE : 14th April 2020
 MATERIAL DESCRIPTION : Colombian Steam Coal
 VESSEL : MV. ALGOMA VISION
 LOAD PORT : Puerto Drummond, Colombia
 DATE LOADED : 9th - 11th April 2020
 B/L WEIGHT : 61,801.47 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	13.3	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	9.2	-	-	ASTM D3173
ASH CONTENT	%	7.4	7.7	8.5	-	ASTM D3174
VOLATILE MATTER	%	33.8	35.4	39.0	42.6	ASTM D3175
FIXED CARBON	%	45.5	47.7	52.5	57.4	ASTM D3172
TOTAL SULPHUR	%	0.73	0.76	0.84	0.92	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	42	44	49	53.55	ASTM D3761
CARBON	%	62.5	65.5	72.1	78.8	ASTM D3178
COAL HYDROGEN	%	4.27	4.47	4.92	5.38	ASTM D3178
NITROGEN	%	1.39	1.45	1.60	1.75	ASTM D3179
OXYGEN (By Difference)	%	10.4	10.9	12.0	13.2	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6145	6436	7088	7747	ASTM D5865
" " "	MJ/Kg	25.730	26.947	29.677	32.434	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5849	-	6889	-	ASTM D5865
" " "	MJ/Kg	24.490	-	28.843	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	50	-	-	ASTM D409
EMISSION FACTOR**	MTCO ₂ /TJoule	94	-	-	-	-

* Net Calorific Value @ Constant Pressure

** Emission Factor as per European Paliament Directive 2003/87/EC

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

for KNIGHT ENERGY SERVICES LTD



Knight Energy Services Limited

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ALFRED H KNIGHT

Page 2 of 2

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 367948/2
 DATE OF ISSUE : 14th April 2020
 MATERIAL DESCRIPTION : Colombian Steam Coal
 VESSEL : MV. ALGOMA VISION
 LOAD PORT : Puerto Drummond, Colombia
 DATE LOADED : 9th - 11th April 2020
 B/L WEIGHT : 61,801.47 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1200	1320	ASTM D1857
ST	1230	1340	ASTM D1857
HT	1270	1370	ASTM D1857
FT	1280	1440	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNITE	VALUE	TEST METHOD
SiO ₂	%	56.60	ASTM D4326
Al ₂ O ₃	%	21.60	ASTM D4326
Fe ₂ O ₃	%	9.78	ASTM D4326
TiO ₂	%	0.93	ASTM D4326
Mn ₃ O ₄	%	0.07	ASTM D4326
CaO	%	2.96	ASTM D4326
MgO	%	1.33	ASTM D4326
Na ₂ O	%	1.69	ASTM D4326
K ₂ O	%	1.99	ASTM D4326
P ₂ O ₅	%	0.08	ASTM D4326
SO ₃	%	2.97	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.7	ASTM D4749
50.0 x 25.0	%	18.5	ASTM D4749
25.0 x 6.25	%	38.4	ASTM D4749
<6.25	%	39.4	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.48	ASTM D 3683
VANADIUM	ppm	17.42	ASTM D 3683
MERCURY	ppm	0.06	ASTM D 3683
ARSENIC	ppm	3.55	ASTM D 3683
MANGANESE	ppm	19.2	ASTM D 3683



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Page 1 of 2

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 370940/1
 DATE OF ISSUE : 3rd August 2020
 MATERIAL DESCRIPTION : Colombian Steam Coal
 VESSEL : **MV. CSL TARANTAU**
 LOAD PORT : Puerto Drummond, Colombia
 DATE LOADED : 28th - 29th July 2020
 B/L WEIGHT : 61,272.16 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	15.6	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	11.8	-	-	ASTM D3173
ASH CONTENT	%	5.3	5.6	6.3	-	ASTM D3174
VOLATILE MATTER	%	35.4	37.0	41.9	44.7	ASTM D3175
FIXED CARBON	%	43.7	45.6	51.8	55.3	ASTM D3172
TOTAL SULPHUR	%	0.46	0.48	0.54	0.58	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	57	60	68	72.57	ASTM D3761
CARBON	%	62.4	65.2	73.9	78.9	ASTM D3178
COAL HYDROGEN	%	4.21	4.40	4.99	5.33	ASTM D3178
NITROGEN	%	1.38	1.45	1.64	1.75	ASTM D3179
OXYGEN (By Difference)	%	10.7	11.1	12.6	13.5	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6096	6370	7223	7708	ASTM D5865
" " "	MJ/Kg	25.523	26.672	30.240	32.273	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5789	-	6967	-	ASTM D5865
" " "	MJ/Kg	24.239	-	28.822	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	51	-	-	ASTM D409
EMISSION FACTOR**	MTCO ₂ /Tjoule	94	-	-	-	-

* Net Calorific Value @ Constant Pressure

** Emission Factor as per European Parliament Directive 2003/87/EC

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

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Page 2 of 2

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 370940/2
DATE OF ISSUE : 3rd August 2020
MATERIAL DESCRIPTION : Colombian Steam Coal
VESSEL : MV. CSL TARANTAU
LOAD PORT : Puerto Drummond, Colombia
DATE LOADED : 28th - 29th July 2020
B/L WEIGHT : 61,272.16 MT

Report of Analysis**ASH FUSION TEMPERATURES**

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1220	1270	ASTM D1857
ST	1240	1290	ASTM D1857
HT	1280	1340	ASTM D1857
FT	1410	1410	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNIT	VALUE	TEST METHOD
SiO ₂	%	54.94	ASTM D4326
Al ₂ O ₃	%	21.54	ASTM D4326
Fe ₂ O ₃	%	8.21	ASTM D4326
TiO ₂	%	1.00	ASTM D4326
Mn ₃ O ₄	%	0.10	ASTM D4326
CaO	%	4.68	ASTM D4326
MgO	%	1.54	ASTM D4326
Na ₂ O	%	2.43	ASTM D4326
K ₂ O	%	1.62	ASTM D4326
P ₂ O ₅	%	0.10	ASTM D4326
SO ₃	%	3.84	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	4.1	ASTM D4749
50.0 x 25.0	%	18.8	ASTM D4749
25.0 x 6.25	%	35.0	ASTM D4749
<6.25	%	42.1	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.42	ASTM D 3683
VANADIUM	ppm	16.33	ASTM D 3683
MERCURY	ppm	0.06	ASTM D 3683
ARSENIC	ppm	3.51	ASTM D 3683
MANGANESE	ppm	18.9	ASTM D 3683

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Page 1 of 2

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 370325/1
 DATE OF ISSUE : 3rd July 2020
 MATERIAL DESCRIPTION : Colombian Steam Coal
 VESSEL : **MV. R.T. HON PAULE E. MARTIN**
 LOAD PORT : Puerto Drummond, Colombia
 DATE LOADED : 29th - 30th June 2020
 B/L WEIGHT : 62,578.63 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	15.9	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	12.0	-	-	ASTM D3173
ASH CONTENT	%	6.5	6.8	7.7	-	ASTM D3174
VOLATILE MATTER	%	34.1	35.7	40.6	44.0	ASTM D3175
FIXED CARBON	%	43.5	45.5	51.7	56.0	ASTM D3172
TOTAL SULPHUR	%	0.61	0.64	0.73	0.79	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	61	63	72	78.01	ASTM D3761
CARBON	%	60.8	63.6	72.3	78.3	ASTM D3178
COAL HYDROGEN	%	4.21	4.41	5.01	5.43	ASTM D3178
NITROGEN	%	1.35	1.42	1.61	1.74	ASTM D3179
OXYGEN (By Difference)	%	10.6	11.1	12.7	13.7	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	5927	6202	7047	7635	ASTM D5865
" " "	MJ/Kg	24.815	25.965	29.506	31.967	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5618	-	6791	-	ASTM D5865
" " "	MJ/Kg	23.523	-	28.432	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	51	-	-	ASTM D409
EMISSION FACTOR**	MTCO ₂ /Tjoule	95	-	-	-	-

* Net Calorific Value @ Constant Pressure

** Emission Factor as per European Parliament Directive 2003/87/EC

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

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Page 2 of 2

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 370325/2
DATE OF ISSUE : 3rd July 2020
MATERIAL DESCRIPTION : Colombian Steam Coal
VESSEL : MV. R.T. HON PAUL E. MARTIN
LOAD PORT : Puerto Drummond, Colombia
DATE LOADED : 29th - 30th June 2020
B/L WEIGHT : 62,578.63 MT

Report of Analysis**ASH FUSION TEMPERATURES**

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1170	1260	ASTM D1857
ST	1220	1290	ASTM D1857
HT	1270	1340	ASTM D1857
FT	1390	1410	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNIT	VALUE	TEST METHOD
SiO ₂	%	54.30	ASTM D4326
Al ₂ O ₃	%	20.46	ASTM D4326
Fe ₂ O ₃	%	10.45	ASTM D4326
TiO ₂	%	0.95	ASTM D4326
Mn ₃ O ₄	%	0.09	ASTM D4326
CaO	%	4.06	ASTM D4326
MgO	%	1.46	ASTM D4326
Na ₂ O	%	2.34	ASTM D4326
K ₂ O	%	1.90	ASTM D4326
P ₂ O ₅	%	0.07	ASTM D4326
SO ₃	%	3.92	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.7	ASTM D4749
50.0 x 25.0	%	19.1	ASTM D4749
25.0 x 6.25	%	37.3	ASTM D4749
<6.25	%	39.9	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.41	ASTM D 3683
VANADIUM	ppm	16.98	ASTM D 3683
MERCURY	ppm	0.06	ASTM D 3683
ARSENIC	ppm	3.42	ASTM D 3683
MANGANESE	ppm	17.4	ASTM D 3683

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ALFRED H KNIGHT

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Page 1 of 2

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 370030/1
 DATE OF ISSUE : 12th June 2020
 MATERIAL DESCRIPTION : Colombian Steam Coal
 VESSEL : MV. CSL TARANTAU
 LOAD PORT : Puerto Drummond, Colombia
 DATE LOADED : 6th - 7th June 2020
 B/L WEIGHT : 61,318.58 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	15.4	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	11.8	-	-	ASTM D3173
ASH CONTENT	%	5.4	5.6	6.4	-	ASTM D3174
VOLATILE MATTER	%	35.0	36.5	41.4	44.2	ASTM D3175
FIXED CARBON	%	44.2	46.1	52.2	55.8	ASTM D3172
TOTAL SULPHUR	%	0.59	0.62	0.70	0.75	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	52	54	61	65.17	ASTM D3761
CARBON	%	62.3	64.9	73.6	78.6	ASTM D3178
COAL HYDROGEN	%	4.33	4.52	5.12	5.47	ASTM D3178
NITROGEN	%	1.37	1.43	1.62	1.73	ASTM D3179
OXYGEN (By Difference)	%	10.6	11.1	12.6	13.4	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6077	6335	7183	7674	ASTM D5865
" " "	MJ/Kg	25.443	26.525	30.074	32.130	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5765	-	6830	-	ASTM D5865
" " "	MJ/Kg	24.138	-	28.822	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	49	-	-	ASTM D409
EMISSION FACTOR**	MTCO ₂ /Tjoule	95	-	-	-	-

* Net Calorific Value @ Constant Pressure

** Emission Factor as per European Parliament Directive 2003/87/EC

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

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ALFRED H KNIGHT

Page 2 of 2

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 37030/2
 DATE OF ISSUE : 12th June 2020
 MATERIAL DESCRIPTION : Colombian Steam Coal
 VESSEL : MV. CSL TARANTAU
 LOAD PORT : Puerto Drummond, Colombia
 DATE LOADED : 6th - 7th June 2020
 B/L WEIGHT : 61,318.58 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1170	1240	ASTM D1857
ST	1190	1280	ASTM D1857
HT	1220	1310	ASTM D1857
FT	1360	1420	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNIT	VALUE	TEST METHOD
SiO ₂	%	53.69	ASTM D4326
Al ₂ O ₃	%	19.24	ASTM D4326
Fe ₂ O ₃	%	10.37	ASTM D4326
TiO ₂	%	0.94	ASTM D4326
Mn ₃ O ₄	%	0.07	ASTM D4326
CaO	%	4.40	ASTM D4326
MgO	%	1.62	ASTM D4326
Na ₂ O	%	3.26	ASTM D4326
K ₂ O	%	1.55	ASTM D4326
P ₂ O ₅	%	0.04	ASTM D4326
SO ₃	%	4.82	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.8	ASTM D4749
50.0 x 25.0	%	18.9	ASTM D4749
25.0 x 6.25	%	37.6	ASTM D4749
<6.25	%	39.7	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.28	ASTM D 3683
VANADIUM	ppm	16.97	ASTM D 3683
MERCURY	ppm	0.06	ASTM D 3683
ARSENIC	ppm	3.36	ASTM D 3683
MANGANESE	ppm	20.2	ASTM D 3683

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ALFRED H KNIGHT

ORIGINAL

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Page 1 of 2

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 368766/1
DATE OF ISSUE : 19th March 2020
MATERIAL DESCRIPTION : Colombian Steam Coal
VESSEL : MV. ALGOMA VISION
LOAD PORT : Puerto Drummond, Colombia
DATE LOADED : 15th - 16th March 2020
B/L WEIGHT : 62,078.82 MT

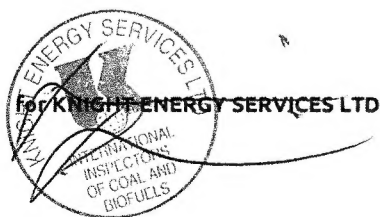
Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	16.1	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	12.2	-	-	ASTM D3173
ASH CONTENT	%	6.5	6.8	7.7	-	ASTM D3174
VOLATILE MATTER	%	33.1	34.6	39.4	42.7	ASTM D3175
FIXED CARBON	%	44.3	46.4	52.9	57.3	ASTM D3172
TOTAL SULPHUR	%	0.63	0.66	0.75	0.81	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	47	49	56	60.67	ASTM D3761
CARBON	%	60.7	63.5	72.3	78.3	ASTM D3178
COAL HYDROGEN	%	4.13	4.32	4.92	5.33	ASTM D3178
NITROGEN	%	1.31	1.37	1.56	1.69	ASTM D3179
OXYGEN (By Difference)	%	10.7	11.2	12.8	13.8	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	5903	6178	7036	7623	ASTM D5865
" " "	MJ/Kg	24.715	25.864	29.458	31.915	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5598	-	6784	-	ASTM D5865
" " "	MJ/Kg	23.437	-	28.404	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	48	-	-	ASTM D409
EMISSION FACTOR**	MTCO ₂ /Tjoule	95	-	-	-	-

* Net Calorific Value @ Constant Pressure

** Emission Factor as per European Parliament Directive 2003/87/EC

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate



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ALFRED H KNIGHT

ORIGINAL

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Page 2 of 2

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 368766/2
DATE OF ISSUE : 19th March 2020
MATERIAL DESCRIPTION : Colombian Steam Coal
VESSEL : MV. ALGOMA VISION
LOAD PORT : Puerto Drummond, Colombia
DATE LOADED : 15th - 16th March 2020
B/L WEIGHT : 62,078.82 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1180	1260	ASTM D1857
ST	1220	1280	ASTM D1857
HT	1260	1330	ASTM D1857
FT	1390	1420	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

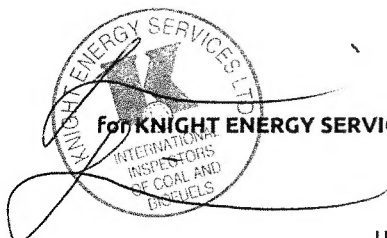
OXIDE	UNITE	VALUE	TEST METHOD
SiO ₂	%	54.62	ASTM D4326
Al ₂ O ₃	%	19.28	ASTM D4326
Fe ₂ O ₃	%	9.54	ASTM D4326
TiO ₂	%	0.90	ASTM D4326
Mn ₃ O ₄	%	0.07	ASTM D4326
CaO	%	4.54	ASTM D4326
MgO	%	1.72	ASTM D4326
Na ₂ O	%	2.61	ASTM D4326
K ₂ O	%	1.70	ASTM D4326
P ₂ O ₅	%	0.04	ASTM D4326
SO ₃	%	4.98	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.8	ASTM D4749
50.0 x 25.0	%	17.7	ASTM D4749
25.0 x 6.25	%	38.7	ASTM D4749
<6.25	%	39.8	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.28	ASTM D 3683
VANADIUM	ppm	15.42	ASTM D 3683
MERCURY	ppm	0.06	ASTM D 3683
ARSENIC	ppm	3.34	ASTM D 3683
MANGANESE	ppm	19.7	ASTM D 3683



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Page 1 of 2

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 369559/1
 DATE OF ISSUE : 18th May 2020
 MATERIAL DESCRIPTION : Colombian Steam Coal
 VESSEL : MV. CSL TARANTAU
 LOAD PORT : Puerto Drummond, Colombia
 DATE LOADED : 12th - 13th May 2020
 B/L WEIGHT : 62,152.11 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	15.1	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	11.2	-	-	ASTM D3173
ASH CONTENT	%	6.3	6.6	7.4	-	ASTM D3174
VOLATILE MATTER	%	33.9	35.4	39.9	43.1	ASTM D3175
FIXED CARBON	%	44.7	46.8	52.7	56.9	ASTM D3172
TOTAL SULPHUR	%	0.59	0.61	0.69	0.75	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	53	56	63	68.03	ASTM D3761
CARBON	%	61.6	64.4	72.5	78.3	ASTM D3178
COAL HYDROGEN	%	4.10	4.29	4.83	5.22	ASTM D3178
NITROGEN	%	1.39	1.46	1.64	1.77	ASTM D3179
OXYGEN (By Difference)	%	11.0	11.5	12.9	14.0	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6055	6333	7131	7701	ASTM D5865
" " "	MJ/Kg	25.349	26.514	29.858	32.244	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5757	-	6884	-	ASTM D5865
" " "	MJ/Kg	24.102	-	28.822	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	50	-	-	ASTM D409
EMISSION FACTOR**	MTCO ₂ /Tjoule	94	-	-	-	-

* Net Calorific Value @ Constant Pressure

** Emission Factor as per European Parliament Directive 2003/87/EC

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

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CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 369559/2
DATE OF ISSUE : 18th May 2020
MATERIAL DESCRIPTION : Colombian Steam Coal
VESSEL : M.V. CSL TARANTAU
LOAD PORT : Puerto Drummond, Colombia
DATE LOADED : 12th - 13th May 2020
B/L WEIGHT : 62,152.11 MT

Report of Analysis**ASH FUSION TEMPERATURES**

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1190	1260	ASTM D1857
ST	1220	1320	ASTM D1857
HT	1240	1350	ASTM D1857
FT	1370	1410	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNITE	VALUE	TEST METHOD
SiO ₂	%	55.39	ASTM D4326
Al ₂ O ₃	%	21.42	ASTM D4326
Fe ₂ O ₃	%	9.34	ASTM D4326
TiO ₂	%	0.97	ASTM D4326
Mn ₃ O ₄	%	0.07	ASTM D4326
CaO	%	3.74	ASTM D4326
MgO	%	1.73	ASTM D4326
Na ₂ O	%	2.10	ASTM D4326
K ₂ O	%	1.82	ASTM D4326
P ₂ O ₅	%	0.08	ASTM D4326
SO ₃	%	3.34	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.6	ASTM D4749
50.0 x 25.0	%	17.0	ASTM D4749
25.0 x 6.25	%	39.1	ASTM D4749
<6.25	%	40.3	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.19	ASTM D 3683
VANADIUM	ppm	17.09	ASTM D 3683
MERCURY	ppm	0.07	ASTM D 3683
ARSENIC	ppm	3.31	ASTM D 3683
MANGANESE	ppm	19.8	ASTM D 3683

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CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 372748/1
 DATE OF ISSUE : 15th October 2020
 MATERIAL DESCRIPTION : Colombian Steam Coal
 VESSEL : MV. CSL TARANTAU
 LOAD PORT : Puerto Drummond, Colombia
 DATE LOADED : 8th October 2020
 B/L WEIGHT : 62,124.42 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	13.2	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	10.8	-	-	ASTM D3173
ASH CONTENT	%	6.2	6.3	7.1	-	ASTM D3174
VOLATILE MATTER	%	35.5	36.5	40.9	44.0	ASTM D3175
FIXED CARBON	%	45.1	46.4	52.0	56.0	ASTM D3172
TOTAL SULPHUR	%	0.73	0.75	0.84	0.90	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	56	58	65	69.97	ASTM D3761
CARBON	%	63.5	65.3	73.2	78.8	ASTM D3178
COAL HYDROGEN	%	4.41	4.53	5.08	5.47	ASTM D3178
NITROGEN	%	1.41	1.45	1.62	1.74	ASTM D3179
OXYGEN (By Difference)	%	10.6	10.8	12.2	13.1	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6177	6348	7117	7661	ASTM D5865
" " "	MJ/Kg	25.864	26.579	29.797	32.074	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5874	-	6767	-	ASTM D5865
" " "	MJ/Kg	24.595	-	28.335	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	48	-	-	ASTM D409
EMISSION FACTOR**	MTCO ₂ /Tjoule	95	-	-	-	-

* Net Calorific Value @ Constant Pressure

** Emission Factor as per European Parliament Directive 2003/87/EC

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

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CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 372748/2
 DATE OF ISSUE : 15th October 2020
 MATERIAL DESCRIPTION : Colombian Steam Coal
 VESSEL : MV. CSL TARANTAU
 LOAD PORT : Puerto Drummond, Colombia
 DATE LOADED : 8th October 2020
 B/L WEIGHT : 62,124.42 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1180	1240	ASTM D1857
ST	1200	1280	ASTM D1857
HT	1240	1320	ASTM D1857
FT	1360	1400	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNIT	VALUE	TEST METHOD
SiO ₂	%	53.05	ASTM D4326
Al ₂ O ₃	%	18.40	ASTM D4326
Fe ₂ O ₃	%	12.19	ASTM D4326
TiO ₂	%	0.82	ASTM D4326
Mn ₃ O ₄	%	0.10	ASTM D4326
CaO	%	5.13	ASTM D4326
MgO	%	1.65	ASTM D4326
Na ₂ O	%	2.07	ASTM D4326
K ₂ O	%	1.70	ASTM D4326
P ₂ O ₅	%	0.04	ASTM D4326
SO ₃	%	4.85	ASTM D5016

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	6.32	ASTM D 3683
VANADIUM	ppm	16.37	ASTM D 3683
MERCURY	ppm	0.08	ASTM D 3683
ARSENIC	ppm	3.52	ASTM D 3683
MANGANESE	ppm	19.4	ASTM D 3683

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CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 371976/1
 DATE OF ISSUE : 21st September 2020
 MATERIAL DESCRIPTION : Colombian Steam Coal
 VESSEL : MV. ALGOMA VISION
 LOAD PORT : Puerto Drummond, Colombia
 DATE LOADED : 15th - 17th September 2020
 B/L WEIGHT : 61,611.21 MT

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	AIR DRIED	DRY BASIS	DRY ASH-FREE	TEST METHOD
TOTAL MOISTURE	%	16.7	-	-	-	ASTM D3302
INHERENT MOISTURE	%	-	11.7	-	-	ASTM D3173
ASH CONTENT	%	4.3	4.6	5.2	-	ASTM D3174
VOLATILE MATTER	%	33.7	35.7	40.4	42.6	ASTM D3175
FIXED CARBON	%	45.3	48.0	54.4	57.4	ASTM D3172
TOTAL SULPHUR	%	0.43	0.46	0.52	0.55	ASTM D3177
CHLORINE	%	0.01	0.01	0.01	0.01	ASTM D2361
FLUORINE	ppm	50	53	60	63.29	ASTM D3761
CARBON	%	62.4	66.1	74.9	79.0	ASTM D3178
COAL HYDROGEN	%	4.21	4.47	5.06	5.34	ASTM D3178
NITROGEN	%	1.32	1.40	1.59	1.68	ASTM D3179
OXYGEN (By Difference)	%	10.6	11.2	12.7	13.4	ASTM D3176
GROSS CALORIFIC VALUE	KCal/Kg	6047	6410	7259	7657	ASTM D5865
" " "	MJ/Kg	25.317	26.837	30.393	32.060	ASTM D5865
NET CALORIFIC VALUE *	KCal/Kg	5734	-	6889	-	ASTM D5865
" " "	MJ/Kg	24.006	-	28.843	-	ASTM D5865
CSN (CRUCIBLE SWELLING NUMBER)	-	-	0.0	-	-	ASTM D 720
HARDGROVE INDEX	-	-	51	-	-	ASTM D409
EMISSION FACTOR**	MTCO ₂ /TJoule	95	-	-	-	-

* Net Calorific Value @ Constant Pressure

** Emission Factor as per European Paliament Directive 2003/87/EC

The analysis were performed for each characteristic according to the ASTM norms outlined in this certificate

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CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER : 371976/2
 DATE OF ISSUE : 21st September 2020
 MATERIAL DESCRIPTION : Colombian Steam Coal
 VESSEL : MV. ALGOMA VISION
 LOAD PORT : Puerto Drummond, Colombia
 DATE LOADED : 15th - 17th September 2020
 B/L WEIGHT : 61,611.21 MT

Report of Analysis

ASH FUSION TEMPERATURES

ASH FUSION TEMPERATURES *			
PARAMETER	REDUCING	OXIDISING	TEST METHOD
IDT	1150	1230	ASTM D1857
ST	1180	1280	ASTM D1857
HT	1200	1310	ASTM D1857
FT	1300	1390	ASTM D1857

* Temperatures in Degrees Celcius

ASH ANALYSIS

OXIDE	UNITE	VALUE	TEST METHOD
SiO ₂	%	51.73	ASTM D4326
Al ₂ O ₃	%	18.24	ASTM D4326
Fe ₂ O ₃	%	10.06	ASTM D4326
TiO ₂	%	0.91	ASTM D4326
Mn ₃ O ₄	%	0.10	ASTM D4326
CaO	%	5.82	ASTM D4326
MgO	%	2.03	ASTM D4326
Na ₂ O	%	3.38	ASTM D4326
K ₂ O	%	1.31	ASTM D4326
P ₂ O ₅	%	0.04	ASTM D4326
SO ₃	%	6.38	ASTM D5016

SIZE ANALYSIS

SIZE (mm)	UNIT	FRACTION	TEST METHOD
>50.0	%	3.7	ASTM D4749
50.0 x 25.0	%	17.2	ASTM D4749
25.0 x 6.25	%	35.9	ASTM D4749
<6.25	%	43.2	ASTM D4749

Trace Metal Analysis

Element	Unit	Value	TEST METHOD
NICKEL	ppm	5.98	ASTM D 3683
VANADIUM	ppm	16.25	ASTM D 3683
MERCURY	ppm	0.07	ASTM D 3683
ARSENIC	ppm	3.39	ASTM D 3683
MANGANESE	ppm	20.0	ASTM D 3683



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